Influence of H2O on NO formation during char oxidation of biomass

The present study investigates conversion of char-N to NO in mixtures of O2/N2 and in O2/H2O/N2. Biomass particles of spruce bark were combusted in an electrically heated single particle reactor at 900°C at various O2/H2O/N2 concentrations. NO concentrations of the product gases were measured during the char combustion stage. The conversion of char-N to NO was significantly higher with H2O as compared to without H2O in the gas. Additional fixed bed experiments were conducted to investigate the products of the reaction between H2O and spruce bark char. The results showed that NH3 is the primary product in the reaction between char-N and steam. These results explain the observation that more NO is formed during char combustion in the presence of steam: the char-N reacts partly with H2O to form NH3, which reacts further to NO.

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